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In Search of Poverty Predictors: The Case of Urban and Rural Pakistan

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The main objective of this research is to provide correlates of household consumption or poverty using the latest household survey. The estimated coefficients and their weights may be used to predict poverty incidence from light monitoring survey such as Core Welfare Indicator Questionnaire (CWIQ). The CWIQ survey instrument essentially collects simple welfare indicators from a large segment of population and is not designed to measure income, consumption or expenditure. The paper estimates consumption functions separately for urban and rural areas. These functions are estimated with the help of non-monetary correlates of consumption and applied to predict poverty at provincial and district levels. The paper also provides the latest estimates of poverty in the country using a consistent methodology. Overall, 33 percent people were poor, according to estimates from the latest available household survey of 2001-02. Incidence, depth, and severity of poverty are high in rural areas, as compared to their urban counterpart.

1. INTRODUCTION

The Core Welfare Indicator Questionnaire (CWIQ) survey instrument essentially collects[1] simple welfare indicators and indicators of access, use, and satisfaction of public services. It is not designed to measure income, consumption or expenditure. Nevertheless, to fully analyse the CWIQ data, it is necessary to devise a means for distinguishing poor from non-poor households. Thus, there is a need to identify a set of poverty correlates or predictors and estimate their respective weights to predict household consumption and to rank households for poverty analysis.

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Author's Note: The views expressed in this paper are those of the author and do not necessarily represent those of the Social Policy and Development Centre.

[1]The Federal Bureau of Statistics, Government of Pakistan, is launching a nationwide survey using the Core Welfare Indicator Questionnaire (CWIQ). The survey will provide district level welfare indicators with a sample size of about 77,000 households. The Government has planned to conduct CWIQ survey over alternate years in the entire country for rapid assessment of indicators on health, education, employment, demography, population welfare, household assets and service delivery system.

This paper provides latest estimates of poverty for the year 2001-02 in the country using consistent[2] methodology. It also computes predicted consumption functions, separately for urban and rural Pakistan. These functions are estimated with the help of non-monetary correlates of consumption and applied to predict poverty at sub-national and sub-provincial levels.

The paper uses Pakistan Integrated Household Survey (PIHS) 2001-02 for the analysis. Household Integrated Economic Survey (HIES) section of the PIHS is mainly used for the estimation of monetary poverty. HIES includes standard and detailed income and consumption modules and is traditionally used to estimate poverty in Pakistan.

The organisation of the paper is as follows. The estimates of the poverty line and poverty during the year 2001-02 are presented in the next section. Section 3 discusses the methodology for modelling predicted consumption function. The estimated poverty correlates are provided in Section 4. Application of the consumption functions to predict poverty at sub-national level is presented in Section 5, while the last section is reserved for some concluding remarks.

2. LATEST POVERTY ESTIMATES

For an inter-temporal comparison of the poverty line and estimates of poverty aggregates (incidence, depth and severity), it is essential to adhere to consistent methodology and norms. The methodology adopted in Jamal (2002) to estimate poverty for the year 1987-88, 1996-97 and 1998-99 is applied to the latest available household survey data (PIHS–HIES, 2001-02). Although the details of various methodological options and recommended steps are provided in that paper, the following is a brief description of the major steps to compute the poverty line and poverty for the year 2001-02.

Poverty can be used to define the poor by total household expenditure falling short of the poverty line by the average dietary pattern the expenditure would translate into fewer calories than required. Therefore to compute the poverty line, calorie norms (cutoff points) and estimated coefficients of the calorie-consumption function (CCF) are required. The idea is to get the estimates of total household expenditure required to obtain the minimum required calories. This paper follows 2550 and 2230 calories per day per adult as calorie norms[3] for rural and urban areas respectively. Household food consumption is translated into calories using Food Consumption Tables for Pakistan [Pakistan (2001)].

[2]In Jamal (2002), a consistent methodology is applied to estimate poverty for the years 1987-88, 1996-97 and 1998-99. Similar methodology is applied in this paper for the year 2001-02.

[3]The Poverty line and, hence, poverty incidence is very sensitive to a change in calorie norms or cutoff points. Therefore, it is highly recommended to adhere to a cutoff point, whatever it may be, for inter-temporal comparison of poverty incidence and the poverty line. Same calorie norms are used for 1987-88, 1996-97, and for 1998-99.

Calorie-consumption functions are estimated separately for urban and rural areas. It is argued that consumption behaviour, purchasing patterns, dietary habits, taste, ecology etc. are extremely different for urban and rural groups. Following Jamal (2002), these functions are estimated from the lower quartile of distribution after ranking households by per capita expenditure. Household per adult daily calorie consumption is regressed on total expenditure (excluding taxes). The functional form is chosen on the basis of maximisation of R^2 criterion. Nonetheless, other statistical tests are also applied before choosing the functional form. The results of these functions are furnished in the Appendix (Table A-1).

Table 1 displays computed poverty lines from these estimated calorie consumption functions. As separate calorie-consumption functions are estimated for urban and rural areas, direct estimation of the national poverty line is not viable. A population weighted average poverty line, however, turns out as Rs 646 per capita per month at the prices of HIES 2001-02 survey.[4]

Table 1

Estimated Poverty Lines (*2001-02*)

	Urban	Rural
Per Day Calorie Requirements—Per Adult Equivalent Unit	2230	2550
Per Day Calorie Requirements—Per Capita **	1889	2104
Poverty Line—Rupees Per Capita Per Month	761	605

Source: Author's estimates based on PIHS-HIES, 2001-02.

****** In order to ease in interpretation, minimum calorie requirements are converted into per capita term using household demographic data and proportionate minimum requirements. The minimum requirements by age and sex are available in Food Consumption Table for Pakistan (2001).

Table 2 displays various measures[5] of poverty for the year 2001-02. The estimated poverty lines for urban and rural areas are mapped on household per capita total expenditure for computing these measures. Overall, 33 percent of the population was poor, according to the above definition of poverty and the poverty line. The incidence, depth and severity of rural poverty are high as compared with the urban areas.

The trend in poverty incidence is portrayed in Table 3. A few observations emerge. On average, 3 percent annual growth in poverty incidence is estimated between the year 1987-88 and 2001-02. The table indicates a relatively higher increase in urban poverty during 1998-99 and 2001-02. Rural poverty in this period

[4]The officially national poverty line is Rs 748.56 per capita per month. However, Government does not notify separate poverty lines for urban and rural areas.

[5]These measures are well known. For detail see Jamal (2002).

Table 2

Estimates of Poverty Measures, 2001-02 (*Percent of Poor Individuals*)

	Head Count Index (Incidence)	Poverty Gap Index (Depth)	FGT2 Index (Severity)
Pakistan	33	7.16	2.27
Urban	30	7.10	2.41
Rural	35	7.18	2.21

Source: Author's estimates based on PIHS-HIES, 2001-02.

Table 3

Trends in Poverty Incidence
(*Percentage of Population below the Poverty Line*)

	1987– 88	1996–97	1998–99	2001–02
Pakistan	23	28	30	33
		(2.4 %)	(3.6 %)	(3.3 %)
Urban	19	25	25	30
		(3.5 %)	(0 %)	(6.7 %)
Rural	26	30	32	35
		(1.7 %)	(3.3 %)	(3.1 %)

Source: Author's estimate for the year 2001-02 is based on PIHS-HIES, 2001-02. The poverty incidences for other years are taken from Jamal (2002). Consistent methodology is applied for all years.

Note: Annual growth rates from previous period are given in parenthesis.

has increased with an annual growth rate of 3.1 percent, while the increase is about 7 percent in the case of urban poverty incidence.[6]

3. MODELLING PREDICTED WELFARE OR POVERTY

It is assumed that the approximating mean function $h(x,\theta)$, relating to response (welfare) variable to the covariates, x is linear in its parameter θ. That is the conditional expectation, $E(y|x)$ of the response y given the covariates is related to the linear predictors by the response link function $h(x,\theta)$. Some continuous variables with strong predictive capabilities were dichotomised to discriminate between poor and non-poor households. These dummy regressors were constructed and included in the model to capture the effects of qualitative independent variables. The resulting

[6]According to the official estimates provided in Pakistan Economic Survey, 2003-04 (page 49), the annual growth in rural poverty between 1998-99 and 2000-01 is 6.2 percent and growth in urban poverty incidence is 4.2 percent. These results are contradictory with our estimates. Although both results are not comparable due to differences in methodology and calorie norms, one important distinction between these two estimates is worth mentioning. This paper uses separate poverty lines for urban and rural areas, while Government uses one poverty line for computing official urban and rural poverty incidences.

variables were then fitted into a model which contains both continuous and discrete dummy variables. The reduce form of the model is specified by Equation (1) below:

$$Y_j = X_j\beta + \lambda_{j1}\gamma_1 + \lambda_{j2}\gamma_{2+\ldots\ldots+}\lambda_{jk}\gamma_k + \mu_j \quad \ldots \quad \ldots \quad (1)$$

where, Y_j is the response variable; X_j is a matrix of continuous explanatory variables; λs are the respective explanatory dummies variables; βs are the estimated coefficients relative to the continuous variables; γs are the estimated coefficients associated with the selected dummy variables; and μ_j is the standard error term. The best poverty predictors were the ones that contributed to a significant marginal increase in the explanatory power of the model.

The response variable may be represented by the total household expenditure.[7] It is a standard multivariate regression analysis and estimates the partial correlation coefficient between expenditure and the explanatory variables. Typically, a logarithmic transformation is applied to the response surface to make the relationship between the *y* and the *x*'s linear. The transformation stabilises the error variance, reduces asymmetry in the distribution of error terms and improves prediction power. The estimated weighted function is continuous and allows the construction of predicted household expenditure which is used as a basis for poverty analysis in light monitoring survey such as CWIQ.

Alternatively, a dichotomous variable explaining poor/non-poor status may be represented as a response variable. In this case, a logit or probit regression of the binary variable is estimated using the maximum likelihood estimation procedure. Based on the assumptions about the error term of the model, probability is computed to predict the household poor/non-poor status.

The selection of appropriate poverty predictors is the next step in the modelling consumption function. Initially the set of regressors includes a host of explanatory variables both discrete and continuous. These initial regressors are essentially household level variables[8] focusing on: household assets, education level and literacy, employment, household amenities, household structure, and demographic characteristics and geographical location. These variables[9] were

[7]The household expenditure is often divided by the poverty line to ensure comparability across regions. Since, in this paper urban and rural welfare predicted functions are estimated separately, it was not felt necessary to divide household expenditure by the poverty line.

[8]The member-level variables such as literacy and enrollment are aggregated at the household level for consistency in the estimation. This aggregation of individual characteristics at the household level produces variables such as proportion of children enrolled in each household, proportion of household members literate etc.

[9]The choice of variable is, however restricted and depends on the availability of data in household survey. For instance, quality of housing stock is an important poverty predictor, but was not included in the initial list of predictors due to non-availability of relevant information in PIHS/HIES. Choice of variables is also depends on the availability of information in CWIQ. All variables that were included are present in the proposed CWIQ survey except some household assets that are not asked in CWIQ.

constructed from the latest household survey (PIHS-HIES, 2001-02) and only those that strongly correlated with household total expenditure were retained for further testing. A stepwise procedure allows one to calibrate the models by dropping explanatory variables with less predictive power.[10] Optimal poverty predictors are selected using a combination of multiple regression analysis and test for correlation and prediction. Once the poverty predictors were identified, their corresponding weights may be used to predict response (household expenditure) variable.

4. POVERTY CORRELATES

As mentioned above, two alternative methods of specifying the response (dependent) variable are available. A continuous variable (log of household expenditure) or a binary variable may be used to statistically correlate household characteristics with poverty status or consumption behaviour. However, it is argued that poverty status binary variable (poor/non-poor) is computed from household expenditure and by using this variable one may loose much of the information available about the actual relationship between expenditure and its explanatory factors. It is, therefore recommended that the analysis is best carried out with the expenditure variable rather than the poor/non-poor status of households.

Nonetheless, to check the sensitivity of results and relative power of prediction, both methods are applied to estimate the consumption function. To a large extent both alternatives yielded similar prediction power, statistical significance of poverty predictors and goodness of fit. Table 4 portrays a comparative picture of both methods in terms of percentage of correct prediction.

Table 4

Predicted Power of Estimated Functions

	Percentage of Correctly Predicted Households		
	Non-poor	Poor	Overall Correct Prediction
Urban Areas			
OLSQ Regression	92.62	58.72	84.02
Logistic Regression	92.24	59.64	83.97
Rural Areas			
OLSQ Regression	90.04	52.06	78.26
Logistic Regression	89.19	55.01	78.58

Source: Author's Estimates.

[10]Various statistical selection criteria are available in selecting best model. These statistics include Akaike Information Criterion, Amemiya Prediction Criterion, Mallows' Prediction Criterion and Schwarz Prediction Criterion. In this paper, Akaike Information Criteria is used to select the best model.

It is evident from the table that both specifications work relatively well in urban areas and estimated 84 percent cases appropriately in the actual category of households. In rural areas, however the prediction power is somewhat less and about 78 percent cases were put in the right category of households. Having reached a conclusion that both specifications are the same in terms of prediction power, further description of results and application are based on a multivariate regression analysis that specifies logarithm of expenditure as the dependent variable.[11]

Tables 5 and 6 present regression results of estimated consumption function for urban and rural areas respectively. The adjusted *R*-square, which is a measure of goodness of fit, is 0.69 for urban and 0.52 for rural areas. In a cross-section analysis, these magnitudes are considered good enough for acceptability of the model. The magnitudes of Durbin-Watson statistic indicate that the relationship between consumption and poverty predictors is not spurious. Multicollinearity among independent variables, which makes the coefficients statistically less efficient and insignificant, is tested through the condition index. The index value greater than 30 indicates severity of multicolinearity and points to less reliability about the magnitude of the coefficients. The estimated results however, indicate that the value of the condition index is less than 30 for urban as well as rural areas. Having illustrated the summary statistics of estimated consumption functions, some observations regarding poverty correlates are in order.

Family size and dependency are important poverty predictors. The dependency is represented by the proportion of children and members greater than 65. Both determinants are highly correlated with expenditure.

In rural areas, ownership of livestock, poultry, land, non-residential and residential property are all positively correlated with household expenditure. Further, medium and large farmers (ownership of land greater than 12.5 acres) play a dominant role in distinguishing non-poor from poor. In fact, the magnitude of coefficient associated with the variable representing medium and large farmers is the highest. Owner cultivator is also an important determinant of household non-poor status.

One variable that appears to be highly correlated with aggregated household total expenditure with strong predictive capability is the "asset score". This variable is constructed by assigning equal[12] weight to each of the seventeen assets[13] listed in the PIHS questionnaire. A constant 1 is assigned to each of the assets owned by the

[11]The detailed results of logit estimates are provided in the Appendix, Table A-2 and Table A-3.

[12]One popular method for obtaining weighted score is the Principal Components Analysis (PCA). The weighted Factor Score, which is derived from PCA is also attempted and used as a regressor instead of score computed by assigning equal weight to each assets. However, no improvement and no significant changes in the results are observed. Therefore, simple scoring of assets is preferred.

[13]These assets are; refrigerator, freezer, air-conditioner, air cooler, geyser, washing machine, camera, cooking range, heater, car, motorcycle, VCR, cassette player, compact disk player, vacuum cleaner and computer.

Table 5

Predicted Consumption Function—Urban Areas
(*Dependent Variable—Logarithm of Total Household Expenditure*)

	Coefficients	Significance Level
Demography		
Family Size	–0.058	0.002
Proportion of Children Less than 5 Years	–0.002	0.000
Proportion of Members Greater than 65 Years	–0.003	0.000
Number of Earners in Household	0.007	0.005
Education		
Proportion of Out of School Children (Secondary)	–0.077	0.016
Highest Education Level in Family	0.006	0.002
Head of Household		
Education Level—Illiterate	–0.046	0.014
Education Level—Primary	–0.044	0.015
Education Level—Higher Secondary	0.093	0.022
Education Level—Tertiary	0.173	0.019
Occupation—Employer	0.188	0.035
Household Assets		
Asset Score	0.094	0.003
Ownership of Non-residential Property	0.131	0.024
Housing Quality and Services		
Person per Room	–0.051	0.003
Telephone Connection	0.216	0.015
Transfers:		
Households Receiving Overseas Remittances	0.286	0.024
Households Receiving Domestic Remittances	0.094	0.018
Locational Variables		
Small Cities and Towns	–0.139	0.011
Punjab Province	–0.218	0.013
NWFP Province	–0.177	0.017
Balochistan Province	–0.053	0.019
Intercept (Constant)	7.629	0.023
Summary Statistics		
Adjusted R-square 0.69	Condition Index	15.49
F-value 592.87	Durbin-Watson	1.58

Source: Author's Estimates based on PIHS-HIES, 2001-02

Table 6

Predicted Consumption Function—Rural Areas
(*Dependent Variable—Logarithm of Total Household Expenditure*)

	Coefficients	Significance Level
Demography		
Family Size	–0.046	0.000
Proportion of Children Less than 5 Years	–0.002	0.000
Proportion of Members Greater than 65 Years	–0.003	0.000
Education		
Proportion of Out of School Children (Secondary)	–0.033	0.000
Proportion of Out of School Children (Primary)	–0.030	0.010
Highest Female Education Level in Family	0.005	0.000
Head of Household		
Education Level	0.009	0.000
Age of Head	0.001	0.000
Occupation—Own Cultivator	0.057	0.000
Occupation—Medium and Large Farmers	0.181	0.000
Occupation—Landless	–0.059	0.000
Household Assets		
Livestock Ownership	0.055	0.000
Poultry Ownership	0.075	0.000
Asset Score	0.107	0.000
Ownership of Non-agriculture Land	0.085	0.000
Ownership of Residential House	0.023	0.037
Housing Quality and Services		
Person per Room	–0.035	0.000
Electricity Connection	0.065	0.000
Telephone Connection	0.164	0.000
No Toilet in House	–0.062	0.000
Transfers		
Households Receiving Overseas Remittances	0.182	0.000
Households Receiving Domestic Remittances	0.038	0.000
Locational Variables		
Sindh Province	0.104	0.000
Balochistan Province	–0.138	0.000
Intercept (Constant)	7.041	0.000
Summary Statistics		
Adjusted R-square 0.52	Condition Index	20.62
F-value 413.39	Durbin-Watson	1.54

Source: Author's Estimates based on PIHS-HIES, 2001-02.

household, and the assets score is obtained by summing up across all assets at the household level. Of course uniform allocation of score irrespective of the asset characteristics tends to smooth out the distribution of assets across households. To the extent that these assets have different values and all exhibit different rates of depreciation, uniform allocation might even increase the distortion in the distribution of household assets. But, what actually matters in this construction is the ownership of assets by a household and not so much the values of the asset which are difficult to estimate accurately from surveys carried out in a single visit to the household. The maximum asset score is 17 and the minimum is 0 for poorest households which possess none of the assets listed.

The significant and major role of education, especially higher education in urban areas is evident from Table 5. The magnitude of the coefficients associated with higher secondary (intermediate) or tertiary education of the head of a household plays a decisive role in determining the household's consumption/poverty status.

The quality of housing structure in terms of material used is an important determinant of poverty status. Unfortunately, the household survey (PIHS, 2001-02) does not provide the relevant information to capture the quality of housing stock. Therefore, only the housing congestion, represented by number of person per room is included in the consumption function. In housing services, telephone connection appeared as an important determinant of poverty status, both in urban and rural areas.

The magnitude of coefficients associated with domestic and overseas transfers clearly indicates the significance of these variables in determining the household's poverty status. In urban areas, the highest magnitude is associated with households receiving overseas remittances.

Above-mentioned poverty correlates, however estimate medium term expenditure. The methodological framework does not allow to explicitly incorporate some short term transitory factors related to price and income shocks in the model. Nonetheless, the predicted consumption/expenditure is a good proxy for permanent income barring some short-term fluctuations.

5. PREDICTED POVERTY INCIDENCE AT THE SUB-NATIONAL LEVEL

The estimated non-monetary poverty correlates with the respective weights[14] are applied to determine the provincial and district level poverty incidence in

[14]It may be hypothesised that the weights or magnitude of non-monetary correlates would be stable overtime (at least in the short run). However, the phenomenon is not yet empirically proved. An attempt was made to estimate consumption functions from HIES 1996-97 data. Despite some missing variables, the magnitudes of coefficients were not off and quite close. Nonetheless in the absence of any strong empirical support, it is difficult to definitely conclude that coefficients are stable overtime.

Pakistan.[15] The estimated response on log scale was transformed back and converted into per capita expenditure to remove the effects of the household size. The transformed predicted response was then used to categorise households into poor/non-poor using the poverty lines described above.[16] Table 7 depicts provincial poverty incidences, separately for provincial capitals, large cities, small cities, and towns and rural areas. The urban and rural poverty incidences at district[17] level are presented in Appendix (Table A-4 and Table A-5 respectively).

Table 7

Predicted Poverty Incidence—2001-02
(*Percentage of Population below the Poverty Line*)

Province	Overall	Urban Areas			Rural Areas
		Provincial Capital	Large Cities	Small Cities and Towns	
Punjab	26	19	21	42	24
	(37.55)	(7.34)	(13.38)	(23.04)	(27.47)
Sindh	31	11	20	38	38
	(30.84)	(7.39)	(5.26)	(13.70)	(27.88)
NWFP	29	28	–	41	28
	(24.72)	(6.25)		(17.32)	(19.03)
Balochistan	48	16	–	41	52
	(36.13)	(3.50)		(13.80)	(32.25)

Note: *t*-values are given in parenthesis. All estimates are statistically significant according to the *t*-statistics. Large cities, in Punjab, are Rawalpindi, Islamabad, Faisalabad, Multan, Gujranwala, Sargodha, Sialkot and Bhawalpur. In Sindh province, Hyderabad and Sukkur are included in this category.

[15]The direct estimates of poverty incidence at provincial or district level from household surveys is not recommended due to large standard errors, non-normality and heteroscedasticity in income or consumption variables. The sample design of HIES allows only the computation of the poverty statistics at the national or regional (urban/rural) with an acceptable measure of reliability. Therefore household consumption, which is predicted with the help of non-monetary indictors, is used to estimate poverty statistics for provinces or districts. It is argued that non-monetary variables (demography, education, housing etc.) are less heterogeneous and normally distributed across the sampling stratum. The size of standard error in two-stage estimates depends largely on the degree of disaggreagation sought and the explanatory power of the exogenous variables in the first-stage model.

[16]Poverty incidences (within sample) are indirectly predicted using the information provided by the estimated consumption functions. For out of sample prediction or prediction overtime, the mean consumption level (constant or intercept term) should be used after adjusting inflation.

[17]District poverty incidences are computed only for those districts which are included in the sampling frame of the Federal Bureau of Statistics.

According to the provincial ranking in terms of lowest poverty incidence, NWFP province ranks second after Punjab province. This may be partly explained with the relatively low rural poverty incidence in NWFP as compared with rural Sindh. The data (not reported here) reveals that overseas and domestic remittances are major contributors towards lowering the poverty incidence in NWFP province. The plight of residents of small cities and towns are also evident from the table.[18] On the average, 40 percent residents of the town are categorised as poor. Balochistan, as expected, ranks the lowest in urban as well as rural poverty levels.

5. CONCLUDING REMARKS

The need to identify a set of poverty predictors and estimate their respective weights arises from the fact that it is expensive to collect detailed household consumption and income data frequently and from a large segment of the population. After devolution of power to the district levels, it is also argued that district-wise poverty estimates should be available to monitor the impact of policies adopted by the district administration. To act in response, the Federal Bureau of Statistics, Government of Pakistan is launching a nationwide survey using the Core Welfare Indicator Questionnaire. This survey instrument essentially collects simple welfare indicators and indicators of access, use and satisfaction of public services. It is not designed to measure income, consumption or expenditure. Nevertheless, to fully analyse the CWIQ data, it is necessary to devise a means for distinguishing the poor from non-poor households.

This paper explored poverty correlates in the context of urban and rural Pakistan. The specificities of developing economies, in particular the dualism between urban and rural areas, motivates one to identify the correlates or determinants of poverty taking into account the clear distinction that must appear either in the analysis of poverty or during the adoption of appropriate economic policies.

At the first step, the poverty incidences for urban and rural areas are estimated using latest available household survey and making use of consistent methodology for poverty estimation. According to the estimates, an overall 33 percent of people were poor during 2001-02. The incidence, depth and severity of poverty is high in rural areas as compared with their urban counterpart. The trend in poverty incidence indicates a relatively high increase in urban poverty during 1998-99 and 2001-02. Rural poverty in this period has increased with an annual growth rate of 3.1 percent, while this percentage is about 7 in the case of urban poverty incidence.

Total household expenditures are then statistically analysed in terms of various household non-monetary (demographic, social, housing etc.) indicators to

[18]These findings are consistent with the earlier study by Ercelawn (1992), for poverty incidence during 1980s.

determine consumption correlates. The results show that in urban areas the main factors which discriminate against poverty include the head of the households education and dependency ratio. In rural areas, asset distribution, especially land and livestock play an important role in distinguishing non-poor from poor. The role of domestic and overseas transfers also appeared significant in discriminating against poverty. Its role is more striking in urban areas.

With the help of these estimated consumption functions, poverty incidences are predicted for provinces and also for selected districts. According to predicted provincial poverty incidence, Punjab ranks first, while Balochistan province ranks forth. Surprisingly, NWFP province ranks second instead of Sindh province. This is, perhaps mainly due to a very low incidence of rural poverty in NWFP. Another important finding, which emerged from this exercise, is that residents of small town and cities are in a vulnerable situation. The poverty incidence in small cities and towns, barring Balochistan rural areas, is the highest in all provinces.

Appendices

Appendix Table A-1

Estimated Calorie-Consumption Functions

	Estimated Coefficients	*t*-value	R^2	*F*-value
Urban Areas			0.25	112.8
Dependent Variable				
Log (Per Adult Calorie Consumption)				
(Constant)	1.290	4.4		
Per Adult Expenditure	0.944	20.4		
Dummy Variable for Sindh	–0.384	–1.3		
Dummy Variable for NWFP	0.112	3.3		
Dummy Variable for Balochistan	0.021	0.6		
Rural Areas			0.20	539.4
Dependent Variable				
Log (Per Adult Calorie Consumption)				
(Constant)	5.977	147.1		
Per Adult Expenditure	0.283	45.5		
Dummy Variable for Sindh	–0.302	–3.9		
Dummy Variable for NWFP	0.093	1.1		
Dummy Variable for Balochistan	–0.967	–10.8		

Source: Estimates are based on PIHS-HIES, 2001-02.

Appendix Table A-2

Estimates of Logistic Function—Urban Areas (*Poor = 1*)

	Coefficients	Significant Level
Demography		
Family Size	0.261	0.000
Proportion of Children Less than 5 Years	0.012	0.000
Proportion of Members Greater than 65 Years	0.015	0.000
Number of Earners	–0.082	0.037
Education		
Proportion of Out of School Children (Secondary)	0.589	0.000
Highest Education Level in Family	–0.044	0.000
Head of Household		
Education Level—Illiterate	0.171	0.109
Education Level—Primary	0.297	0.010
Education Level—Higher Secondary	–0.343	0.179
Education Level—Tertiary	–0.416	0.077
Occupation—Employer	–0.961	0.014
Household Assets		
Asset Score	–0.540	0.000
Ownership of Non-residential Property	–0.504	0.039
Housing Quality and Services		
Person per Room	0.220	0.000
Telephone Connection	–1.136	0.000
Transfers		
Overseas Remittances Receiving Household	–2.050	0.000
Domestic Remittances Receiving Household	–0.521	0.001
Locational Variables		
Small Cities and Towns	0.771	0.000
Punjab Province	1.108	0.000
NWFP Province	0.991	0.000
Intercept (Constant)	–4.383	0.000

Source: Estimates are based on PIHS-HIES, 2001-02.

Appendix Table A-3

Estimates of Logistic Function—Rural Areas (*Poor = 1*)

	Coefficients	Significant Level
Demography		
Adult Equivalent Unit	0.253	0.000
Proportion of Children Less than 5 Years	0.005	0.019
Proportion of Members Greater than 65 Years	0.017	0.000
Education		
Proportion of Out of School Children (Secondary)	0.133	0.042
Proportion of Out of School Children (Primary)	0.184	0.028
Female Highest Education Level in Family	–0.054	0.000
Head of Household		
Education Level	–0.045	0.000
Age of Head	–0.004	0.092
Occupation—Own Cultivator	–0.437	0.000
Occupation—Large Farmers	–0.943	0.000
Occupation—Landless	0.068	0.455
Household Assets		
Livestock Ownership	–0.240	0.001
Poultry Ownership	–0.731	0.000
Asset Score	–0.648	0.000
Ownership of Non-agriculture Land	–0.602	0.000
Ownership of Residential House	–0.309	0.000
Housing Quality and Services		
Person per Room	0.178	0.000
Electricity Connection	–0.328	0.000
Telephone Connection	–1.333	0.000
No Toilet in House	0.422	0.000
Transfers		
Overseas Remittances Receiving Household	–1.380	0.000
Domestic Remittances Receiving Household	–0.363	0.000
Locational Variables		
Sindh Province	–0.572	0.000
Balochistan Province	0.533	0.000
Intercept (Constant)	–3.107	0.000

Source: Estimates are based on PIHS-HIES, 2001-02.

Appendix Table A-4

Urban Poverty Incidence—District Scenario
(*Predicted Percentage of Population below the Poverty Line*)

	Overall		Large City Sample		Small City and Town Sample	
Districts	Incidence	*t*-value	Incidence	*t*-value	Incidence	*t*-value
Islamabad	6.87	(2.6)	6.87	(2.6)		
Sialkot	13.95	(3.2)	13.95	(3.2)		
Rawalpindi	24.22	(7.1)	19.39	(4.6)	31.04	(5.5)
Lahore	24.29	(10.7)	18.62	(7.3)	41.20	(8.9)
Faisalabad	28.78	(10.1)	23.28	(6.7)	35.88	(7.6)
Gujranwala	29.30	(8.8)	13.98	(3.6)	38.94	(8.4)
Multan	35.39	(10.4)	28.65	(5.7)	39.76	(8.7)
Sargodha	37.27	(9.2)	24.00	(4.4)	40.80	(7.4)
Bahawalpur	46.59	(10.1)	40.54	(5.2)	48.04	(8.4)
D. G. Khan	65.79	(10.8)			65.79	(10.8)
Karachi	11.38	(7.4)	11.38	(7.4)		
Sukkur	28.68	(6.7)	14.88	(2.1)	32.46	(5.9)
Mirpurkhas	32.05	(5.6)			32.05	(5.6)
Hyderabad	33.62	(9.0)	21.21	(4.6)	45.22	(7.9)
Larkana	40.28	(8.0)			40.28	(8.0)
Bannu	17.30	(3.2)			17.30	(3.2)
Haripur	19.98	(4.5)			19.98	(4.5)
Peshawar	31.86	(9.4)	27.56	(6.2)	41.47	(7.7)
D. I. Khan	37.65	(4.6)			37.65	(4.6)
Kohat	44.30	(6.8)			44.30	(6.8)
Mardan	46.98	(8.6)			46.98	(8.6)
Malakand	53.45	(8.1)			53.45	(8.1)
Quetta	23.25	(5.8)	16.49	(3.5)	46.51	(6.1)
Makran	29.72	(5.2)			29.72	(5.2)
Sibi	32.13	(3.7)			32.13	(3.7)
Nasirabad	43.23	(5.7)			43.23	(5.7)
Zhob	43.83	(4.4)			43.83	(4.4)
Kalat	47.67	(8.3)			47.67	(8.3)

Source: Estimates are based on PIHS-HIES, 2001-02 and the estimated consumption function.

Appendix Table A-5

Rural Poverty Incidence—District Scenario
(*Predicted Percentage of Population below the Poverty Line*)

Districts	Incidence	*t*-value
Rawalpindi	4.17	(1.7)
Jhelum	7.49	(2.2)
Islamabad	8.96	(2.9)
Gujranwala	10.07	(2.7)
Sargodha	12.64	(4.2)
Mianwali	17.11	(3.2)
Narowal	18.40	(3.5)
Sialkot	19.29	(3.4)
Sahiwal	19.70	(4.0)
T.T. Singh	19.70	(4.1)
Faisalabad	20.51	(6.1)
M. Bahuddin	21.31	(5.2)
Attack	21.75	(4.0)
Bahawal Nagar	22.51	(4.7)
Lahore	24.91	(4.5)
Hafizabad	26.24	(4.7)
Bhakker	27.27	(3.5)
Khushab	27.96	(4.3)
Okara	29.70	(7.3)
Pak Pattan	30.42	(4.1)
Jhang	30.42	(6.6)
Bahawalpur	30.91	(6.5)
Khanewal	32.12	(6.1)
Sheikhupura	32.58	(6.6)
Lodhran	34.06	(4.6)
Kasur	34.68	(7.1)
Multan	37.03	(6.8)
Muzaffargarh	38.39	(7.8)
D.G. Khan	40.24	(5.6)
Layyah	42.24	(4.0)
Vehari	44.60	(7.3)
R.Y. Khan	45.66	(9.6)
Rajanpur	62.09	(6.3)
Karachi	26.29	(3.9)
Tharparkar	28.45	(5.4)

Continued—

Appendix Table-5—(*Continued*)

Districts	Incidence	*t*-value
Khairpur	32.71	(7.4)
Badin	33.08	(6.3)
Hyderabad	33.14	(7.2)
Ghotki	33.70	(5.7)
Thatta	34.35	(6.9)
Nawabshah	36.46	(6.1)
Nashero Feroze	38.39	(7.1)
Larkana	42.23	(10.1)
Sanghar	42.53	(8.6)
Dadu	42.92	(9.1)
Mirpur Khas	43.23	(8.4)
Shikarpur	43.87	(6.2)
Sukkur	52.46	(6.0)
Jaccobabad	63.19	(11.3)
Abbottabad	12.15	(2.4)
Mansehra	15.02	(4.0)
Karak	20.24	(2.4)
Swat	21.80	(4.7)
Dir	21.98	(4.7)
Batagram	22.67	(3.3)
Charsadda	24.96	(4.5)
Bonair	25.63	(3.6)
Nowshera	27.11	(3.6)
Shangla	28.88	(3.3)
Mardan	29.64	(5.9)
Swabi	29.77	(4.7)
Kohistan	31.97	(4.0)
Tank	32.81	(4.5)
Bannu	34.47	(5.8)
Hangu	38.73	(3.8)
D.I. Khan	45.98	(8.4)
Peshawar	47.41	(8.2)
Quetta Division	33.48	(10.2)
Mekran Division	37.78	(8.5)
Sibi Division	53.24	(11.1)
Kalat Division	56.20	(16.4)
Zhob Division	58.28	(14.7)
Nasirabad Division	58.73	(15.0)

Source: Estimates are based on PIHS-HIES, 2001-02 and the estimated consumption function.

Note: Due to insignificant *t*-value (large standard errors), District Gujrat from Punjab and districts Bonair, Malakand, Kohat, Haripur and Luki Marrwat of NWPF province are excluded from the analysis.

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